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# Construction Technology of Slope Excavation and Support for Hydraulic Engineering

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**Abstract:** With the development of the Chinese social economy, more and more attention is paid to water conservancy construction, water conservancy project construction is related to the national economy and people's livelihood, in Xinjiang water conservancy project construction, because of the water conservancy project construction period, involving wide, poor conditions, large span, and other factors, so the water conservancy construction in the slope excavation and support construction is more difficult, How to effectively improve the quality of water conservancy engineering construction, do a good job in slope excavation and support construction work. Below we will combine a hydraulic engineering construction example, to analyze the application of slope excavation and support technology in hydraulic engineering construction for you.

**Keywords:** Water conservancy project; Slope excavation; Support technology

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## Introduction

Water conservancy projects benefit the country and the people, the construction quality of slope excavation and support is closely related to the quality of water conservancy projects, so the relevant units of water conservancy projects should pay attention to the construction quality of slope excavation and support, increase the capital investment of excavation and support technology, constantly carry out technological innovation and utilization, and effectively ensure the construction quality of slope excavation and support. This paper mainly introduces the slope excavation control blasting technology, excavation process, and excavation geophysical analysis and detection, while analyzing the construction strategy of slope support, with the continuous development of modern science and technology, it is believed that water conservancy engineering slope excavation and support construction technology will be further developed and utilized to promote the sustainable development of water conservancy engineering construction.

## 1. Water conservancy engineering slope excavation construction process

Before the construction of the water conservancy project slope excavation, technical disclosure should be carried out to make relevant staff familiar with and master the construction process of water conservancy project slope excavation. Under normal circumstances, the slope excavation process mainly has three points:

First, do a good job of slope surface plant cleaning. Before the construction, relevant staff should be organized to treat the surface vegetation of the slope to prepare for the excavation construction. In this process, the clearing range should be extended to 5m outside the maximum edge line of the excavation area in strict accordance with the construction drawing of the water conservancy project, and the root excavation range should be extended to 3m outside the maximum edge line of the (open) excavation area. At the same time, attention should be paid to the vegetation and environmental problems near the excavation area of the slope, and the natural environment should be destroyed as far as possible.

Second, strictly control the construction quality of earthwork excavation. In the construction of earthwork excavation, the construction method from top to bottom is generally adopted, and the appropriate type of excavator (such as PC220) is used to peel the soil layer by layer and become a certain slope by the requirements (the main function is to remove water). It should be noted here that before the construction, the slope interception canal should be used to drain the water, to ensure that there is no water in the stable area of the slope, and at the same time, a certain soil slope should be reserved in the upper part of the slope during the construction process, which is convenient for the second manual treatment.

Third, carry out stone excavation work. Stone excavation mainly includes riverbed and left and right bank dam abutment two parts, for the riverbed excavation, the use of relevant equipment from the top down to excavate, and in the excavation of foundation pit stone, first from

the downstream of the bank of the pioneer trench, and then respectively upward and downstream expansion, and finally the use of the previously excavated pioneer trench to both sides of the dam blasting. For the left and right bank abutment stone excavation, the equipment and construction technology used in the two are the same, the only difference is that when the left bank abutment stone excavation is carried out, the excavation slope of each layer and the pre-split blasting slope are completed at one time according to the design.

## 2. Water conservancy engineering slope excavation control blasting technology

Water conservancy engineering slope excavation control blasting technology mainly has three points: first, blasting hole and buffer hole blasting technology. Water conservancy engineering construction is susceptible to hydrology, geology, meteorology, and other natural conditions, which not only affect the progress and quality of water conservancy engineering construction, but also cause obstacles to the slope excavation blasting construction, so the general use of hydraulic drilling blasting hole and buffer hole construction, in this process, to ensure that the distance between the buffer hole and the pre-crack hole is about 1.5m, and the two parallel. At the same time, the diameter of the buffer hole roll is 50mm, the blocking section is between 1m and 1.5m, the form of uncoupled continuous charge is presented, and the diameter of the blasting hole roll is 70mm, and the vertical distance between the blasting hole and the pre-crack hole is not less than 2.5m. The second is the blasting network and control technology. A blasting network is a more commonly used non-electric detonator hole differential sequence blasting network, to control the maximum single charge amount of the arch dam base pre-crack hole below 20kg, of which, 30m to 15m between no more than 75kg, pre-crack detonation time greater than 75ms to 100ms, 15m below no more than 25kg, Strictly control the blasting speed according to the relevant standards. Third, pre-crack blasting technology. Pre-crack holes are generally divided into slope pre-crack holes and bridleway horizontal pre-crack holes, among which, bridleway horizontal pre-crack holes generally use 2 blasting ladder sections for pre-crack, the diameter of the coil is 32mm, and the hole plugging is between 1m and 1.5m.

## 3. Hydraulic engineering slope excavation geophysical analysis and monitoring

On the one hand, it is necessary to strengthen the geophysical analysis of hydraulic engineering slope excavation. Before the slope excavation, the use of related equipment to explore the slope blasting loose situation, the content of geophysical analysis mainly includes the development of cracks, hole wall rough problems, rock integrity problems, etc. Geophysical analysis can improve the construction technology and optimize the relevant parameters of excavation technology, to ensure the quality of slope excavation. On the other hand, do a good job of slope excavation detection. The blasting vibration is monitored and controlled according to the attenuation law, which provides the basis for slope excavation and effectively improves the quality of slope excavation.

## 4. Main points of water conservancy project construction and conservancy engineering slope support

Water conservancy project construction is closely associated with the social economy and people's lives in the situation of rapid development of modern economic construction. Water conservancy projects have been vigorously built. Slope excavation and support as an important part of water conservancy project construction, its construction quality is directly related to the quality of water conservancy project construction to a large extent.

### 4.1 The main structure of water conservancy engineering slope support

The commonly used structures of water conservancy engineering slope support mainly include concrete anti-slip structures, concrete frame structures, prestressed anchor cable structures, and paving hole structures. Among them, the construction process of prestressed anchor cable structure is slope dressing → anchor rod and hanging net layout → jet mixture → secondary jet mixture (containing seeds) → do a good job of moisturizing and rain prevention.

### 4.2 Key technical points of slope support construction of water conservancy project

(1) shotcrete. This technology is a method commonly used in the slope support construction of hydraulic engineering, which has the function of making the slope foundation surface firmer and more closed after excavation, and preventing the weathering phenomenon of the bedrock of the foundation surface because it is in the natural environment for a long time. Such as a water project using a 2 S1500 model of forced mixer for concrete mixing work, the use of a 6m<sup>3</sup> concrete mixing transport truck to transport materials to the slope support site, and then the use of a concrete jet in the anchor rod construction steel pipe scaffold platform for spraying material, the thickness of the spray material in 10 ~ 20cm.

(2) anchor bolt bundle technology. Before the construction of bolt bundle technology, relevant preparations should be made, such as the selection of bolt drilling parameters, scaffolding construction, etc. According to the specific situation of the hydraulic engineering slope support construction site, select the corresponding bolt, set up scaffolding with a height greater than 2m before the construction, drill the hole

along the natural trend, and tilt the Angle of the rock in strict accordance with the construction standards during the construction, and adjust the position of the bolt hole accordingly until the construction standards and requirements are met. At the same time, under normal circumstances, the diameter of the drill bit should be greater than the diameter of the rod, and immediately stop drilling after drilling to the standard depth set in advance, and then use the high-pressure wind to clean the impurities around the drilling hole.

(3) Drainage hole construction technology. Water conservancy projects have the characteristics of long drainage time, so the drainage hole design should be carried out accordingly in the construction of slope support, and this method is used most in the areas where there are more concrete structures. Generally speaking, the drainage hole construction should use an air compressor, PVC blind pipe (mainly to prevent the occurrence of caving phenomenon), and other equipment, according to the relevant drainage standards and specific requirements for design and construction, to improve the drainage effect of water conservancy projects.

(4) The laying of steel mesh should also be carried out. To do a good job of shotcrete and concrete support work. Shotcrete is also often used in the early process of high slope support. The main implementation content is to strengthen and close the excavated infrastructure surface, effectively reduce the frequency of sunlight exposure of the water conservancy project infrastructure surface, and reduce the number of wind and rain to ensure the quality of the infrastructure surface. This method is widely used in the excavation of the high slope of the factory building, the excavation process of the air raid shelter exit, and the excavation process of the stone dam, which can play a good supporting effect. In the supply process of concrete generally equipped with 2 JS1500 type of forced mixer, the capacity of concrete transport truck is generally about 6m<sup>3</sup>.

## 5. Conclusion

To sum up, in the construction of water conservancy projects, do a good job of slope excavation and support technology for each construction section. In the process of slope support and excavation in the construction of water conservancy projects, effective measures should be taken to solve some construction technical problems promptly, which must be implemented in each link of the construction of water conservancy projects, and timely measures should be taken to deal with possible hidden dangers in the project. To ensure the smooth completion of water conservancy projects.

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